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# Questions & Answers

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## Pesticides and Mosquito Control

Mosquito-borne diseases affect millions of people worldwide each year. In the United States, some species of mosquitoes can transmit diseases such as encephalitis, dengue fever, and malaria to humans, and a variety of diseases to wildlife and domestic animals. To combat mosquitoes and the public health hazards they present, many states and localities have established mosquito control programs. These programs, which are based on surveillance, can include nonchemical forms of prevention and control as well as ground and aerial application of chemical and biological pesticides.

The mission of the Environmental Protection Agency (EPA) is to protect human health and the environment. EPA reviews and approves pesticides and their labeling to ensure that the pesticides used to protect public health are applied by methods which minimize the risk of human exposure and adverse health and environmental effects. In relation to mosquito control, the Agency also serves as a source of information about pesticide and non-pesticide controls to address the concerns of the general public, news media, and the state and local agencies dealing with outbreaks of infectious diseases or heavy infestations of mosquitoes. The following questions and answers provide some basic information on mosquito control, safety precautions, and information on insecticides used for mosquito control programs.

### **1. How does EPA ensure the safest possible use of pesticides?**

EPA must evaluate and register pesticides before they may be sold, distributed or used in the United States. The Agency is also in the process of reassessing and when appropriate, reregistering all older pesticides (registered prior to 1984) to ensure that they meet current scientific standards. To evaluate a pesticide for either registration or re-registration, EPA assesses a wide variety of potential human health and environmental effects associated with use of the product. The producer of the pesticide must provide data from tests done according to EPA guidelines. These tests determine whether a pesticide has the potential to cause adverse effects on humans, wildlife, fish and plants, including endangered species and non-target organisms. Other tests help to assess the risks of contaminating surface water or groundwater from leaching, runoff or spray drift. If a pesticide meets EPA requirements, the

pesticide is approved for use in accordance with label directions. **However, no pesticide is 100 percent safe and care must be exercised in the use of any pesticide.**

## 2. How are mosquitoes controlled with pesticides and other methods?

The first step in mosquito control is surveillance. Mosquito specialists conduct surveillance for diseases harbored by domestic and non-native birds, including sentinel chickens, and mosquitoes.

### **Key Tools in Combating Mosquitoes**

**Public education and prevention around the home** – eliminating mosquito breeding habitats (any standing water) around the home. Proper use of mosquito repellants and common sense measures to reduce exposure to insecticides.

**Larvicide** – insecticide designed to kill mosquitoes during its larval stage. Larvicides are applied to known mosquito breeding areas to kill larvae.

**Adulticide** – insecticide designed to kill adult mosquitoes. Mosquito control professionals apply adulticides with ultra low volume (ULV) spray equipment which releases tiny particles of insecticide solution into the air. The amount of pesticide released is typically a few ounces per acre of treated area. Adulticides may be applied from aircraft, vehicles on the ground, or by professional applicators on foot.

Surveillance for larval habitats are conducted using maps, aerial photographs, and by evaluating larval populations. Other techniques include various light traps, biting counts; and analyzing reports by the public. Mosquito control programs also put high priority on trying to prevent a large population of adult mosquitoes from developing, so that additional controls may not be necessary. Since mosquitoes must have water to breed, methods of prevention may include controlling water levels in lakes, marshes, ditches, or other mosquito breeding sites, eliminating small breeding sites if possible, and stocking bodies of water with fish species that feed on larvae. Both chemical and biological measures may be employed to kill immature mosquitoes during larval stages. *Larvicides* target larvae in the breeding habitat before they can mature into adult mosquitoes and disperse. Larvicides include the bacterial insecticides *Bacillus thuringiensis israelensis* and *Bacillus sphaericus*, the insect growth inhibitor methoprene, and the organophosphate insecticide temephos. Mineral oils and other materials form a thin film on the surface of the

water which cause larvae and pupae to drown. Liquid larvicide products are applied directly to water using back-pack sprayers and truck or aircraft-mounted sprayers. Tablet, pellet, granular and briquet formulations of larvicides are also applied by mosquito controllers to breeding areas.

Adult mosquito control may be undertaken to combat an outbreak of mosquito-borne disease, or a very heavy nuisance infestation of mosquitoes in a community. Pesticides registered for this use are *adulticides* and are applied either by aircraft or on the ground employing truck-mounted sprayers.

State and local agencies commonly use the organophosphate insecticides malathion and naled, and the synthetic pyrethroid insecticides permethrin, resmethrin and sumithrin for adult mosquito control.

Mosquito adulticides are applied as ultra-low volume (ULV) sprays. ULV sprayers dispense very fine aerosol droplets that stay aloft and kill flying mosquitoes on contact. ULV applications involve small quantities of pesticide active ingredient in relation to the size of the area treated, typically less than three ounces per acre, which minimizes exposure and risks to people and the environment.

### **3. What can I do to reduce the number of mosquitoes in and around my home?**

The most important step is to eliminate potential breeding habitats for mosquitoes. Get rid of any standing water around the home, including water in potted plant dishes, garbage cans, old tires, gutters, ditches, wheelbarrows, bird baths, hollow trees, and wading pools. Any standing water should be drained, including abandoned or unused swimming pools. Mosquitoes can breed in any puddle that lasts more than four days. Make sure windows and screen doors are "bug tight." Replace outdoor lights with yellow "bug" lights. Wear headnets, long sleeve shirts, and long pants if venturing into areas with high mosquito populations, such as salt marshes or wooded areas. Use mosquito repellants when necessary, always following label instructions.

### **4. Should I take steps to reduce exposure to pesticides during mosquito control spraying?**

Generally, there is no need to relocate during mosquito control spraying. The pesticides have been evaluated for this use and found to pose minimal risks to human health and the environment when used according to label directions. For example, EPA has estimated the exposure and risks to both adults and children posed by ULV aerial and ground applications of the insecticides malathion and naled. For all the exposure scenarios considered, exposures ranged from 100 to 10,000 times below an amount of pesticide that might pose a health concern. These estimates assumed several spraying events over a period of weeks, and also assumed that a toddler would ingest some soil and grass in addition to dermal exposure. Other mosquito control pesticides pose similarly low risks. (For more details on health and environmental risk considerations, see the separate EPA fact sheets on the specific mosquito control pesticides).

Although mosquito control pesticides pose low risks, some people may prefer to avoid or further minimize exposure. Some common sense steps to help reduce possible exposure to pesticides include:

- \* Listen and watch for announcements about spraying in the local media and remain indoors during the application to the immediate area.
  
- \* People who suffer from chemical sensitivities or feel spraying may aggravate a preexisting health condition, may consult their physician or local health department and take special measures to avoid exposure.

\* Close windows and turn off window-unit air conditioners when spraying is taking place in the immediate area.

\* Do not let children play near or behind truck-mounted applicators when they are in use.

## 5. Where can I get more information?

For more information about mosquito control in your area, contact your state or local health department. The federal Centers for Disease Control and Prevention is also a source of information on disease control, and their Internet web site includes a listing of state health departments. To contact the **Centers for Disease Control and Prevention (CDC)**:

**Telephone: 970-221-6400**  
**Fax: 970-221-6476**  
**E-mail: [dvbid@cdc.gov](mailto:dvbid@cdc.gov)**  
**web site: <http://www.cdc.gov>**

Information on pesticides used in mosquito control can be obtained from the state agency which regulates pesticides, or from the **National Pesticide Telecommunications Network (NPTN)**. The NPTN web site includes links to all state pesticide regulatory agencies.

**Toll-free hotline: 1-800-858-7378 (9:30 a.m. to 7:30 p.m. EST) daily except holidays.** Callers outside normal hours can leave a voice mail message, and NPTN returns these calls the next business day.

**E-mail: [nptn@ace.orst.edu](mailto:nptn@ace.orst.edu)**  
**web site: <http://ace.orst.edu/info/nptn>**

Information on mosquito control programs can also be obtained from the **American**

**Mosquito Control Association (AMCA)**

This site also lists many county mosquito agencies.

**web site: <http://www.mosquito.org>**

For more information regarding the federal pesticide regulatory programs, contact:

**EPA Office of Pesticide Programs**

**Telephone: 703-305-5017**

### Other Helpful EPA Publications

For Your Information - How to Use Insect Repellents Safely (735-F-93-052R)

For Your Information - Mosquitoes: How to Control Them (735-F-98-003)

For Your Information - Larvicides for Mosquito Control (735-F-00-002)

For Your Information - Naled for Mosquito Control (735-F-00-003)

For Your Information - Malathion for Mosquito Control (735-F-00-001)

For Your Information - Synthetic Pyrethroids for Mosquito Control (735-F-00-004)

**Fax: 703-305-5558**

E-mail: [opp-web-comments@epa.gov](mailto:opp-web-comments@epa.gov)  
web site: <http://www.epa.gov/pesticides>

## EPA Regional Offices

Region I - CT, MA, ME, NH, RI, VT

**888-372-7341**

[www.epa.gov/region01](http://www.epa.gov/region01)

Region II - NJ, NY, PR, VI

**212-637-3660**

[www.epa.gov/region02](http://www.epa.gov/region02)

Region III - DE, DC, MD, PA, VA, WV

**800-438-2474 or 215-814-5000**

[www.epa.gov/region03](http://www.epa.gov/region03)

Region IV - AL, FL, GA, KY, MS, NC,  
SC, TN

**800-241-1754**

[www.epa.gov/region4](http://www.epa.gov/region4)

Region V - IL, IN, MI, MN, OH, WI

**800-621-8431** (Region V only)

or **312-353-2000**

[www.epa.gov/region5](http://www.epa.gov/region5)

Region VI - AR, LA, NM, OK, TX

**800-887-6063** (Region VI only)

or **214-665-6444**

[www.epa.gov/region6](http://www.epa.gov/region6)

Region VII - IA, KS, MO, NE

**800-223-0425 or 303-312-6312**

[www.epa.gov/region7](http://www.epa.gov/region7)

Region VIII - CO, MT, ND, SD, UT, WY

**800-227-8917** (Region VIII only)

or **303-312-6312**

[www.epa.gov/region08](http://www.epa.gov/region08)

Region IX - AZ, CA, HI, NV, AS, GU

**415-744-1500**

[www.epa.gov/region09](http://www.epa.gov/region09)

Region X - AK, ID, OR, WA

**800-424-4372** (Region X only)

or **206-553-1200**

[www.epa.gov/r10earth](http://www.epa.gov/r10earth)